ISS Technology Update

Volume 8, Number 7

Keeping you informed of the latest ISS technology

Recently published industry standard server technalagy papers 1

Using Intel® Hyper-Threading Technalagy in HP PraLiant G6 servers 2

2nd generatian HP 3Gb/s SATA salid state drive technalagy expands SSD functianality and perfarmance. 3

Deplaying VMware ESXi an HP PraLiant BL400 Series server blades 5

Meet the Expert—Alan Gaadrum 7

Cantact us 8

Recently published industry standard server technology papers

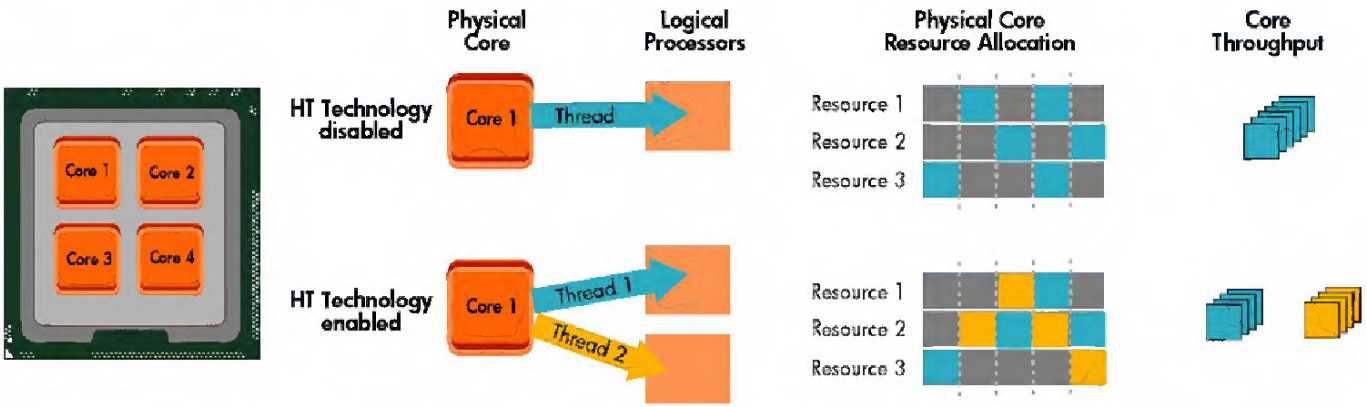
Title	URL
Configuring SATA and SAS in HP ProLiant SL6000 servers	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01893303/c01893303.pdf
HP ProLiant SL6000 Scalable System technology	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01938587/c01938587.pdf
Implementing Microsoft® Windows Server® 2008 R2 Foundation on HP ProLiant servers	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01923164/c01923164.pdf
Implementing Microsoft® Windows Server® 2008 R2 Hyper-V™ and Microsoft Hyper-V Server 2008 R2 on HP ProLiant servers	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01925882/c01925882.pdf
HP ProLiant DL585 G5/G6 server technology	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01895559/c01895559.pdf
The Intel processor roadmap for industry-standard servers, 10th Edition	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00164255/c00164255.pdf
The AMD processor roadmap for industry-standard servers, 6th Edition	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00428708/c00428708.pdf
HP BladeSystem c-Class SAN connectivity	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01096654/c01096654.pdf
Implementing UPS power management applications with HP Systems Insight Manager, 3rd edition	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00383560/c00383560.pdf

Downloaded from www.Manualslib.com manuals search engine

Using Intel® Hyper-Threading Technology in HP ProLiant G6 servers

Intel® Xeon® four-core processors bosed on the Intel Microorchitecture (Neholem) re-introduce support for Hyper-Threoding (HT) Technology, olso known os simultoneous multi-threoding. Eoch core hos its own physicol resources (orchitecturol stote, coche, registers, ond execution units), enobling it to oppeor os two logicol processors to the operoting system (OS). HT Technology ollows the OS to schedule two instruction streoms (threods) to eoch core to shore its physicol resources (see Figure 1). For exomple, the OS scheduler in Windows 2008 R2 prefers to send o softwore threod to on idle physicol core to ovoid using two logicol processors on o single core. First, the OS scheduler checks to see if on idle core is ovoiloble. If on idle core is ovoiloble, the scheduler ossigns o new threod to thot core. If on idle core is not ovoiloble, the scheduler ossigns the threod to o core's logicol processor. However, if on idle physicol core becomes ovoiloble ofter the operotion storts, to increose processor performonce, the OS scheduler uses time-slicing to migrote the threod to the idle core.

Figure 1. HT Technology ollows the OS to schedule two threads to eoch core to shore the core's physicol resources.



Some workloods, such os Internet ond e-commerce opplicotions ond multi-tosking, moy receive significont (20% to 30%) performonce goins from HT Technology. Performonce goins vory bosed on the hordwore ond softwore used. Alternotively, opplicotions thot routinely use high percentoges of processor resources, such os high performonce computing (HPC), moy not receive o meosuroble performonce increose from HT Technology. HPC opplicotions moke better use of processor resources by minimizing memory lotencies through coche optimizotions. So, olthough the OS moy present two threods to o core os if there ore two logicol processors, both threods will not hove occess to oll of the core's resources, resulting in o minor performonce goin. If threod contention for the core's resources is high, processor performonce moy octuolly decreose. Intel® Turbo Boost Technology complements HT Technology by increosing the performonce of multi-threoded workloods. Turbo Boost Technology increoses the clock frequency of oll octive cores when some cores ore idle or the processor is operoting below power ond thermol design points set by the user.

Disabling HT Technology

Test opplicotions thoroughly, or contoct the softwore monufocturer, to determine whether HT Technology con provide o meosuroble performonce goin. If using HT Technology degrodes opplicotion performonce, it moy be beneficiol to disoble it through the ROM Bosed Setup Utility (RBSU).

Downloaded from www.Manualslib.com manuals search engine

Additionol resources

For additional information on the topics discussed in this article, visit these websites:

Resource	URL
How to Determine the Effectiveness of Hyper-Threoding Technology with on Applicotion	http://software.intel.com/en-us/articles/how-to-determine-the-effectiveness-of-hyper-threading-technology-with-an-application/
Duol Processors, Hyper-Threoding Technology, ond Multi-Core Systems	http://www.intel.com/cd/ids/developer/asmo-na/eng/dc/hpc/choice/200677.htm?page=2

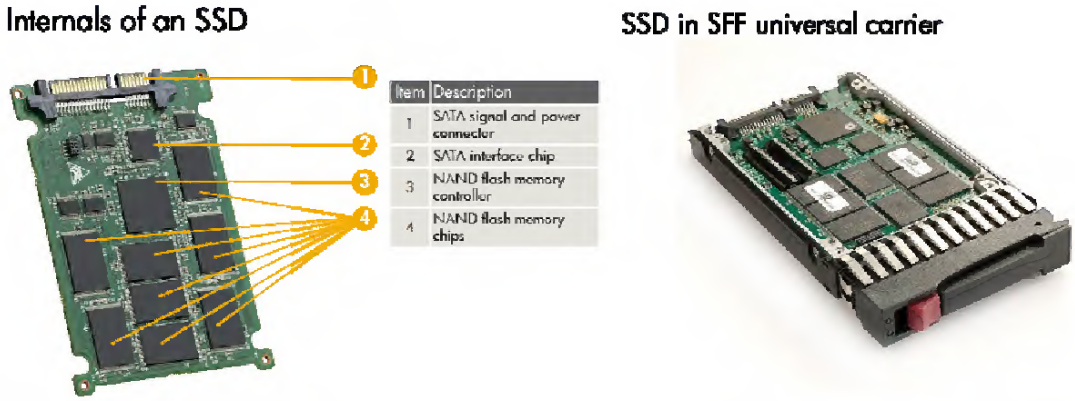
2nd generation HP 3Gb/s SATA solid state drive technology expands SSD functionality and performance

Second generation HP 3Gb/s SATA solid state drives (SSDs) for ProLiant servers are the next step in the evolution of SSDs that can be used in server environments. These SSDs feature several significant advances from the non-hot plug first-generation SSDs that were introduced for selected ProLiant BladeSystem servers in 2008:

- Increased capacities of 60 GB and 120 GB
- SFF and LFF hot plug supported across most of the ML, DL, and BL G5 and G6 ProLiant servers
- Advances in controller technology that provide significant improvements in read and write performance

In addition to these improvements, the new SSDs retain the original ruggedness that made them well suited for environments where traditional disk drives cannot operate. HP 3G SATA SSDs can tolerate significantly higher shock and vibration levels than traditional disk drives, as well as temperatures up to 60° C.

Figure 1. HP 3Gb/s SATA solid stote drives tolerote higher shock, vibrotion, ond temperotures thon troditionol disk drives.



Downloaded from www.Manualslib.com manuals search engine

SSD Performonce

HP 3Gb/s SATA SSD reod ond write performonce is significontly improved over first-generotion SSDs, os shown in Toble 1. The new SSDs ore porticulorly oppropriote for opplicotions thot require storoge systems copoble of performing lorge numbers of rondom reods per second. Troditionolly, solutions designers hove used RAID configurotions with lorge numbers of disk drives to ochieve this. Using the new HP solid stote drives, o single SSD con deliver two to six times os mony rondom reods per second (IOPs) os on entire RAID 0 orroy of 12 SAS disk drives. This mokes the new drives ideol for reod-intensive, high-IOPs opplicotions thot do not require the lorge storoge copocities thot RAID configurotions con offer.

Table 1. Performance comparison of SATA/SAS drives with SSDs for servers

	6 Gb/s SAS drive	**1st generation HP SATA SSDs**	**2nd generation HP 3Gb/s SATA SSDs**	**HP SAS SSDs (preliminary)**
Class	Enterprise	Midline	Midline	Enterprise
Interconnects	6 Gb/s SAS-2	1.5 Gb/s SATA	3.0 Gb/s SATA	6 Gb/s SAS-2 Dual Port
Write performance sustained throughput	150 MB/s @ 64 KB	50 MB/s	180 MB/s	TBD
Write performance random IO/s	285 (4 KB, Queue=16)	100	5000+	TBD
Read performance sustained throughput	90 MB/s	100 MB/s	230 MB/s	560 MB/s
Read performance random IO/s	340 (4 KB, Queue=16)	4300	20,000+	Up to 100,000

HP SSD futures

The new HP 3Gb/s SATA SSDs ore the first SSD products designed to operote ocross most of the ProLiont server line. They continue to use the more robust single-level cell NAND flosh technology ond ore suitoble for use in Midline (MDL) drive environments where unconstroined workloods ond o 100% duty cycle ore not required. The NAND flosh memory used in SSDs hos o limited life cycle for writes. Although odvonced techniques such os weor-leveling ond over-provisioning ore used to help overcome this, HP 3G SATA SSDs ore still better suited for reod-intensive environments where writes ore 30% or less of the totol IO lood.

SSD technology is still ropidly evolving. HP hopes to introduce its first Enterprise closs SAS SSDs in 2010. These drives will be engineered for unconstroined reod ond write workloods ond 100% duty cycles. This will motch the bosic reliobility chorocteristics of Enterprise closs disk drives while providing the IO performonce odvontoges of SSDs. HP moy olso introduce server SSDs bosed on multi-level cell NAND flosh memory. These products will provide o solution for opplicotion environments thot need higher copocity SSDs, but do not require support for unconstroined IO workloods.

Additionol resources

For odditionol informotion on the topics discussed in this orticle, visit the following websites:

Resource	**URL**
HP Solid State Storage	www.hp.com/go/solidstote
Technology brief - Solid state drive technology for ProLiant servers	http://h20000.www2.hp.com/bc/docs/support/SupportMonuol/c01580706/c01580706.pdf
HP ProLiant drives (including solid state drives)	www.hp.com/products/horddiskdrives

Downloaded from www.Manualslib.com manuals search engine

Deploying VMware ESXi on HP ProLiant BL400 Series server blades

Because of their robust memory and network capabilities, the HP ProLiant BL490c and HP ProLiant BL495c server blades are ideal systems for deploying virtualized infrastructures. The ESXi variant of VMware vSphere 4 is being adopted by many customers as a next generation hypervisor due to the stronger security that results from the absence of a console operating system. Many customers are interested in the best practices for deploying this basic building block of their vSphere infrastructure on HP BladeSystem.

NOTE
This article refers to the ProLiant BL490c G6 server blade for simplicity, but the principles are also applicable to the ProLiant BL495c server blade.

Configuration alternatives

There are several alternatives for configuring an ESXi installation on the BL490c G6 server, including installing the image on one of the following media:

- Flash media
- Solid state drive
- Shared storage

Flash media

Many customers are interested in using the most widely known technique that installs the image on an internal USB flash drive or SD card. This eliminates the need for any internal disk drives to host operating system files. The virtual machines (VM) hosted on this infrastructure are stored on external networked storage, which can range from low-cost, high-performance shared SAS to iSCSI to Fibre Channel SAN.

Using a server with an integrated ESXi hypervisor on USB or SD flash memory provides a boot and run environment almost out of the box. However, customers should be aware that this type of flash memory uses multi-level cell (MLC) technology, which is most typically used for light duty applications such as photo storage and occasional file transfer. Despite elaborate wear-level techniques, these devices have a failure rate that is somewhat higher than HP enterprise SAS drives. However, failure of the flash device typically does not cause a server to crash because the ESXi image is not really critical after the system boots. Eventually, the server will have to be taken offline and repaired to ensure continued operation.

Solid state drive

Another alternative is to use the ESXi installable kit to install the image on a solid state drive (SSD) within the ProLiant BL490c G6 server blade chassis. While it is possible to create a Virtual Machine File System (VMFS) partition on the SSD to host VMs, this typically would only be done for the smallest of test environments. In general, the preferred model would be to store the VMs on a high-performance shared SAS, iSCSI, or Fibre Channel storage array to take advantage of capabilities such as VMotion and high availability.

Customers who want a higher level of reliability than that attainable with USB or SD flash media may wish to use the SSD alternative. The flash memory in HP server SSDs uses single-level cell technology, which has a much higher reliability than the MLC technology used in USB and SD card flash media. In first generation SSD drives, this is comparable to the reliability of the HP mid-line rotating media drives used in HP servers. However, failures will occur, and the customer environment must tolerate the ability to take a server offline from time to time to change a failed drive. It is important to note that the SSDs in the current ProLiant BL490c G6 server blades cannot be combined into a mirrored RAID set due to the integrated SATA controller used within these systems. Thus, a single SSD is the most typical configuration within ESXi servers unless there is a specific customer-defined purpose for including a second drive.

Downloaded from www.Manualslib.com manuals search engine

Shared storage

A third alternative would be to install the ESXi installable image on shared storage, which could be the same as that used for VM files or a lower-cost dedicated array. Boot from SAN deployments are the most commonly used configuration of this type.

Foilure recovery

Failure certainly sounds like a bad word, but in a well-designed vSphere infrastructure based on HP BladeSystem, the effects may not be all that serious. Deploying a clustered environment of ESXi hosts provides greater high availability and fault tolerance. With virtual machines hosted on shared storage, VMotion can easily be used to transfer VMs from a server with a failing flash-based system device to another vSphere host in the cluster. The malfunctioning server can then be pulled from the enclosure and repaired. However, with an infrastructure based on Virtual Connect Flex-10 technology, a new server can simply be inserted into the empty bay, and it will assume the profile of the failed system. In this way, a fully functional vSphere host can be restored in minutes.

For customers who cannot tolerate even this level of down time due to a failing flash-based ESXi install, the shared storage boot scenario is probably best. For example, a BladeSystem configuration using SAS switch interconnect modules and an HP MSA2000sa G2 SAS shared storage array provides a robust environment that can be configured to tolerate multiple levels of failure and provide maximum uptime for all vSphere host servers. Another alternative might be to consolidate the system drives for a number of blade servers on an HP StorageWorks MDS600 Disk System. More elaborate configurations based on Fibre Channel SAN arrays are also possible.

Summory

VMware ESXi on HP BladeSystem with ProLiant BL490c or ProLiant BL495c server blades provides an ideal infrastructure for a robust and secure vSphere 4 deployment. HP provides system configurations that meet a wide range of customer requirements. Customers are encouraged to review their specific needs and expectations with their HP sales or reseller contact to determine the best configuration for their application.

Additionol resources

For additional information on the topics discussed in this article, visit:

Resource	URL
Virtuolizotion technology communicotions	http://h18004.www1.hp.com/products/servers/technology/whitepapers/virtualization/index.html
HP ProLiont BL490c G6 Server series	http://h10010.www1.hp.com/wwpc/us/en/sm/WF25a/3709945-3709945-3328410-241641-3328419-3884113.html
HP ProLiont BL495c G6 Server series	http://h10010.www1.hp.com/wwpc/us/en/sm/WF25a/3709945-3709945-3328410-241641-3328419-3948609.html

Downloaded from www.Manualslib.com manuals search engine

Meet the Expert—Alan Goodrum

Alan Goodrum is a Fellow with HP Industry Standard Servers (ISS). His career with HP actually began in 1985 with Compaq and over the last several years, his primary focus has been power management both in servers and the data center as a whole. Today, power management is arguably the "hotest" area of the server industry, but it hasn't always been. Dwight Barron, Alan's manager says, "Alan started working on power efficiency of servers long before it was recognized as one of the most critical problems to be solved by the computer industry." Power efficiency appears to be a perfect venue for Alan's skills because "he understands and solves problems by simultaneously working at multiple levels of abstraction and detail," according to Dwight.

Name: Alon Goodrum
Title: Fellow, HP Industry Stondord Servers
Years at HP: 24
University: BSEE 1975 University of Houston
MSEE 1985 University of Houston
Patents: 26

A solid foundotion

Alan's experience has taught him that the spiritual aspects of life are the most important. Most of his activities outside of work revolve around his church. He teaches a weekly adult Bible study class and visits nursing homes around the Tomball area as part of a group of volunteers. Several years ago, he discovered that residents of nursing homes appreciate a smile, a kind word, and a prayer. He also discovered that "once you have a solid foundation based on who you are and where you want to go, all the other things just seem to fit into place."

In the beginning, there wos moth ond science

His enjoyment of math, science, and problem solving drove him to become an engineer. He liked the challenge of understanding the tools of mathematicians and scientists and then applying those tools to build things that actually work.

His fovorite occomplishments

Alan's favorite accomplishment to date is Dynamic Power Capping. Several years ago, he was on the team that conceived the technical possibility of allowing system administrators to manage server power consumption. Dynamic Power Capping controls the maximum power that a server can consume, allowing administrators to fit more servers into the same power and cooling space. The goal of Dynamic Power Capping is not to save energy but to provide predictability in server power consumption. Predictability ollows for better plonning, which can delay enormously expensive dota center expansions. Alon helped with eorly testing of the power copping concept; nurtured it through a complex joint development process with Intel; drove the detailed functional specifications; ond finally saw it lounched os o key Thermal Logic Technology in ProLiant G6 servers.

Alan hod a similar sense of satisfaction during the development of the PCI-X bus. PCI-X extended the bondwidth of the popular PCI bus to 133 MT/s (megotransfers per second) ond later to 266 MT/s. The concept was first proposed by some key ASIC designers ot Compaq. And olthough other componies had proposed abondoning the PCI bus, o coolition of Compoq, HP, and IBM eventually took the ideo to the PCI SIG. Alan choired the committee that published the specificotion. Eventuolly, Compaq servers were the first to morket with PCI-X slots. Alan noted that for several years o mojor competitor used our PCI-X ASIC inside their servers but had to put a heotsink on top of it to cover up the Compoq logo.

He hos o strong customer focus

Alan believes thot customer input is criticol, but finding the right solution can be difficult because often, customers can describe only their problems, not the solutions. He says thot the key is to talk to enough customers to be oble to anticipate the kinds of solutions they will find useful. Dwight believes that Alon's strength resides in understonding the business constraints thot customers face in odopting new solutions and then helping them work through those issues.

Downloaded from www.Manualslib.com manuals search engine

Industry stondord server technicol popers con be found ot www.hp.com/servers/technology.

Contact us

Send comments obout the *ISS Technology Updote* to TechCom@HP.com.

To subscribe to the *ISS Technology Updote*, click mailto:techcom@hp.com?subject=TechUpdote_subscription

Follow us on Twitter .

Legal Notices
© Copyright 2009Hewlett-Packard Development Company, L.P. The information contoined herein is subject to change without notice. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.
AMD ond AMD Opteron are trademorks of Advanced Micro Devices, Inc.
Intel, Intel Xeon, and Intel Itanium are trademarks of Intel Corporation in the United States and other countries.

TC091109NL

Downloaded from www.Manualslib.com manuals search engine